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ABSTRACT

Two concerns led to the development of the screening test which is described: (1) the present 28% rate of attrition of Navy female first enlistees is too high; and (2) attrition is expected to increase when a high school diploma is no longer required for women to enter the Navy. Thus, a screening instrument was needed which could be used currently, as well as after the selection requirements are changed. A total of 977 female recruits were administered one of two exploratory 120-item questionnaires designed to measure eight areas: personal history/demography; female role perception; mental health; motivation to fail; realistic expectation of Navy; enlistment motivation; similarity to previous successful recruits; and occupational needs. Eighteen months later, it was found that 204 females out of the sample were dropouts and 773 were survivors. A number of analyses were performed to determine which items best discriminated between dropouts and survivors, using a cross-validation sample. It was concluded that the items measuring mental health, occupational need, enlistment motivation, and personal history are the best predictors; and that futher revisions of this test should be used in conjunction with the Armed Services Vocational Aptitude Battery (ASVAB). (GDC)

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THE PREMATURE ATTRITION OF NAVY FEMALE ENLISTEES*

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THE PREMATURE ATTRITION OF NAVY FEMALE ENLISTEES[1]

Background

Gradually, women are obtaining greater opportunities in the Navy defense establishment, as evidenced by progress in four areas: (1) it is easier for women to gain entrance into the Navy and Navy programs than it has been previously, (2) women are participating in a greater range of work activities, (3) a greater number of training opportunities are open to them, and (4) there are signs that they are being accepted by Navy management as "one of the Navy's own."

Four historical developments indicate that it is becoming progressively easier for women to gain entrance to the Navy and its programs. In 1967, the two percent ceiling on women in each service was abolished by Congress. In 1972, Admiral E. Zumwalt, the then Chief of Naval Operations, made women eligible for NROTC scholarships, thereby giving them access to another officer training program. In 1974, the age regulations governing selection procedures throughout the military were standardized so that women were no longer required to be older than men. In 1976, entrance of women into the military academies was cleared by an amendment to the Defense Appropriation Bill.

One development, in particular, illustrates the expansion of women's work roles in the Navy, i.e., issuance of "Z-Gram 116" by Admiral Zumwalt in 1972. This directive specified that women were to become eligible for (1) all enlisted ratings, (2) shore command positions, (3) the Chaplain and Civil Engineer Corps, and (4) flag rank (i.e., admiral status) within managerial and technical specialties.

One indication that women are receiving greater training opportunities in the Navy was the issuance in 1976 of a directive requiring women to take apprenticeship training if they were not eligible for "A" School. This training provides a basic shipboard orientation and is a prerequisite for acquiring an apprenticeship position.

In addition to the expansion of women's work roles and training opportunities, there are signs that women are gradually being accepted by Navy management as "one of the Navy's own." For example, their uniform has been redesigned to make it more compatible with their new work roles. Also, a "summer whites" uniform, previously available only to men, is currently being tested for women.

In summary, it can be stated that women increasingly are becoming a more integral part of the Navy community and are shouldering a greater

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[1]The opinions and assertions contained herein are those of the senior author and are not to be construed as official or reflecting the views of the Navy Department.

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share of the defense burden. Moreover, this trend is expected to continue--the Chief of Naval Personnel (Note 1) has recommended that the Navy double its percentage of women by 1983.

Problem

Two problems gave rise to the current study. First, although the attrition rate of Navy female first enlistees has been declining since 1973, it is still considered to be too high--approximately 23 percent (see Thomas, Note 2). Secondly, it is expected that the attrition rate will increase when and if women are no longer required to have a high school diploma for acceptance into the Navy, i.e., when and if selection requirements for women become the same as those for men. Research with men (Plag & Goffman, 1966; Lockman & Gordon, 1977; Sands, 1977) has consistently demonstrated that educational level is the most valid predictor of premature attrition.

Purpose

The current study was an exploratory one, designed to lay the groundwork for (1) an instrument which could be used in the relatively near future for screening female applicants (Goal 1) and, to a lesser extent, (2) a screening instrument which could be used when and if female applicants are no longer required to have a high school degree (Goal 2). In order to reach these goals, the study investigated the relationship between the premature attrition of Navy female first enlistees and preenlistment variables, such as personal history, demographic traits, and attitudes. It was believed that these variables would be especially useful for reaching Goal 1. That is, it was believed that these variables would be less attenuated for women, and thus more predictive, than, for example, most of the variables currently used to select males (Lockman & Gordon, 1977). The selection procedure for males utilizes age, mental level, educational level, and number of dependents for which an applicant is financially responsible. However, the last three variables are attenuated for women; mental level and educational level because of the high school degree requirement and the last because the male typically assumes responsibility for a family's financial obligations. It should be noted that educational level and mental level should become more useful as predictor variables when and if the high school degree requirement is abolished for women. It was believed, however, that additional variables will be needed in order to effectively predict attrition. The present study (Goal 2) laid the groundwork for locating them.

Approach

Instruments. A questionnaire approach was utilized in the study. Two questionnaires termed Quest 1 and 2 were constructed, composed of "common" and "unique" items. Common items were those which were identical on both questionnaires. Unique items were those which were found on one questionnaire but not the other. The unique items on one questionnaire were, at times, parallel in form to those on the other questionnaire. At other times, unique items on one questionnaire measured totally different aspects of a general construct, such as mental health, than did items on the other questionnaire.

Each questionnaire was composed of 120 items which were conceptually grouped into eight areas, as shown in Table 1. Copies of Quest 1 and 2 are available from the senior author.

Table 1

Content Areas and Number of Items: Quest 1 and 2

Content Area	Number of Items
Personal History/Demography	26
Female Role Ideology	6
Mental Health	24
Motivation to Fail	6
Realistic Expectations of Navy	4
Enlistment Motivation	21
Similarity to Previous Successful Recruits	6
Occupational Needs	27
TOTAL	120

Items relating to personal history and demographic traits were conceived on a logical basis, i.e., they were perceived as being related to attrition. Item topics included number of males in the household when growing up, previous emotional reactions to time spent away from home, and type of discipline received during teenage years.

Items were included on female-role ideology, using the concepts of "traditional" and "contemporary" ideologies advanced by Lipman-Blumen (1972). Approximately 80 percent of the enlisted women in the Navy are assigned to traditional jobs. It was thus hypothesized that the less traditional a woman was in her role orientation, the more likely she was to attrite.

It was believed in the current study that poor mental health was related to attrition ((see, for example, Craighill (1947) and Schuckit and Gunderson (1971)). Mental health items developed by Friedman (1956) were used in Quest 1 and 2.

Horner (1969) found that the motive to fail characterizes the personality of many women. It was believed in the current study that this motive would lead ultimately to attrition. A story involving a hypothetical, successful, woman Recruit Chief Petty Officer was included in the questionnaires, as a projective device, to measure the motive to fail.

Porter and Steers' review article (1973) concluded that one cause of turnover may be the unrealistic expectations of individuals upon entering an organization. Items were thus constructed which asked the respondent whether she had any relatives or friends in the military and whether she had discussed their experiences with them.

Enlistment motivation was also tapped by the questionnaires. To develop items, 50 women were interviewed who had recently been assigned to their first duty station. Generally speaking, an "empirical" approach was utilized, i.e., no hypotheses were advanced relating enlistment motivation to attrition.

Items were designed to assess the similarity of the respondent to previous successful recruits. A woman who had previously been a recruit company commander was interviewed and "success" traits identified, such as (1) a tendency toward conformity, (2) a commitment to the Navy as a career, and (3) a deliberative rather than an impulsive decision-making style.

It was believed in the current study that a general set of occupational needs may exist that are optimally compatible with Navy life. Individuals possessing these needs would be more likely to experience job satisfaction and perhaps less likely to attrite. Items were adapted for use from Hall's Occupational Orientation Inventory (1971).

Sample and Data Collection. One of the two questionnaires was administered to each female recruit after she had been assigned to her company, but before her actual training had begun.[2] Twenty companies participated, with a total N of 977. Questionnaires were administered in May, June, and July of 1975 and a deadline of December 1976 established for determining whether a woman was an attritee or a survivor.[3]

Data Analysis. Analyses were conducted for individual items (referred to below as the "first" and "second" analyses) and scales (referred to as "third" and "fourth" analyses.) In the first analysis, chi-square and

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[2]Since the study was an exploratory one, the "restriction of range" problem inherent in using a recruit sample was not deemed critical.

[3]The use of one deadline for all subjects, instead of, for example, using an 18-month lag period for each person, was not viewed as serious because of the study's exploratory nature.

"strength of association" (SA) statistics were computed between each item and attrition. The Cramer V was utilized as a measure of SA for nominally-scaled items, while tau b and c were used for ordinally-scaled items. Sample N's for the unique Quest 1, unique Quest 2, and common items were 485 (105 attritees and 380 survivors) (Sample A), 492 (99 attritees and 393 survivors) (Sample B), and 977 (204 attritees and 773 survivors) (Sample C), respectively. As reported later, more unique Quest 1 items emerged as significant in the chi-square analysis than did for the other types of items. Therefore, in the second analysis, Sample A (1) was divided randomly in two, (2) ordinally-scaled items were identified in the first subsample which evidenced a tau of .10 or greater, and (3) a regression analysis was conducted with the second subsample utilizing (a) the identified items as predictors and (b) the attritee--survivor status of the woman as the criterion. A shrunken R was then computed.

In the third analysis, the empirical keying approach of Campbell (1971) was utilized to identify a set of discriminating response options or "scale", i.e., a set of response options, each of which had been selected by at least 10 percent more attritees than survivors, or vice versa. This approach was utilized separately for Samples A, B, and C. The fourth analysis also utilized Campbell's approach. Samples A, B, and C were each randomly divided into a validation and cross-validation sample. A unit weighting scoring system was devised based on validation sample data. That is, a plus or a minus 1 was assigned to a discriminating response option, as appropriate, and a zero to non-discriminating options. This system was then utilized with the cross-validation sample to produce a scale score for each woman. Scores for the entire cross-validation sample were then correlated with attrition.

RESULTS

The Relationship Between Items and Attrition

Table 2 presents the results for all the unique Quest 1 items which were significantly related to attrition. These items are broken down into those which were ordinally-scaled and those which were nominally-scaled. For ordinally-scaled items, the exact nature of their relationship with attrition is specified--for example, the table indicates (see Item 41) that a woman is more likely to attrite if she values individuality as opposed to conformity. For the nominally-scaled items, only the general content of the item is supplied.

Twenty-one of the 57 items unique to Quest 1 demonstrated a statistically significant relationship with attrition in the chi-square analysis ($p < .10$).[4] However, the absolute strength of these relationships was weak, obtained statistics varying from .008 (item 92, tau c) to .215 (item 52, tau b). Of the eight areas advanced at the start of the study as possible indicators of attrition, only two--mental health and occupational needs--produced a sizeable number of significant items in the chi-square analysis. The relationship between the mental health items and attrition was as hypothesized, i.e., the more the woman perceived herself as nervous, headache-prone, etc., the more likely she was to attrite. Although no hypotheses were advanced for the occupational need items, a discernible need profile emerged for the attritee.

Table 3 presents the results for those items unique to Quest 2 which were significantly related to attrition, while Table 4 presents the results for significant common items. Eight of the 57 unique Quest 2 items and nine of the 63 common items were significantly related to attrition, although, once again, the actual strength of these relationships was weak. Most of the significant unique Quest 2 items represented the mental health area, while the significant common items represented the personal history and enlistment motivation areas.

Even though strength of association statistics were generally low for the significant items, the possibility existed that combining the items in a multivariate fashion would increase their predictive value. An exploratory analysis was conducted, therefore, composed of the following steps: (1) Individuals in Sample A (i.e., individuals completing Quest 1) were randomly assigned in a 50-50 fashion to one of two subsamples, (2) ordinally-scaled items were identified in subsample 1 which evidenced a tau statistic $\geq .10$, and (3) these items were then utilized as predictors with subsample 2 in a multiple regression analysis in which the survivor-attritee status of the woman served as the criterion. Eighteen items were subsequently identified for subsample 1. Results are available from

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[4] It was judged that this significance level was appropriate for an exploratory study.

Table 2

Unique Quest 1 Items Which Were Significantly Related to Attrition

Ordinally-Scaled Items

Item Number	Category[a]	X^2(df)	p	Strength of Association[b]	Nature of Relationship: Woman More Likely to Attrite If She
41	SR	11.109(3)	.011	-.067	Values individuality
46	MH	13.903(1)	.001	.174	Reacts poorly to pressure
47	MH	5.261(1)	.022	.109	Is nervous person
52	MH	21.087(1)	.001	.215	Experiences many headaches
56	MH	3.637(1)	.057	.097	Had bossy teachers
60	MH	5.140(1)	.023	.109	Is subject to depression
62	MH	19.687(1)	.001	.208	Trembles with anxiety
63	MH	5.366(1)	.021	-.114	Had poor childhood health
64	MH	7.579(1)	.006	.131	Has difficulty sleeping
66	MH	12.809(1)	.001	.168	Worries a lot
71	ON	12.908(4)	.012	-.105	Desires autonomy
73	ON	8.981(4)	.062	.109	Doesn't value novelty
76	ON	16.488(4)	.002	.106	Doesn't value work teams
77	ON	9.185(4)	.057	.064	Doesn't value caring supervisor
78	ON	8.698(4)	.069	.083	Doesn't value job respect
79	ON	14.376(4)	.006	.083	Doesn't value orderly procedures
89	ON	8.355(4)	.079	.031	Doesn't value set plans
92	ON	8.083(4)	.089	.008	Doesn't value interpersonally-oriented jobs
94	ON	13.060(4)	.011	-.089	Enjoys working outdoors

Nominally-Scaled Items

Item Number	Category[a]	X^2(df)	p	Strength of Association[b]	Item Content
34	RE	19.630(4)	.001	.202	Group activities with males
35	FR	10.492(4)	.033	.150	Family religion

Note. N = 485.

[a]Category abbreviations: RE = items on realistic expectations about Navy, FP = items on female role ideology, SR = items on similarity to previous successful recruits, MH = mental health items, ON = occupational need items.

[b]For ordinally-scaled items, tau b was computed for the 2 x 2 situation, i.e., when the df were 1, and tau c was computed in all other situations, i.e., when the df were greater than 1. For nominally-scaled items, a Cramer V was computed.

Table 3

Unique Quest 2 Items Which Were Significantly Related to Attrition

Item Number	Category[a]	X^2(df)	p	Strength of Association[b]	Nature of Relationship: Woman More Likely to Attrite If She
34	MH	10.694(4)	.030	-.054	Had a neglectful mother
47	MH	5.619(1)	.018	.112	Is nervous
49	MH	6.445(1)	.011	.121	Had severe childhood punishment
52	MH	5.252(1)	.022	.110	Faints a lot
54	MH	6.574(1)	.010	.122	Believes she has bad luck
60	MH	9.112(2)	.011	.099	Is chronically tired
66	MH	6.753(1)	.009	.123	Becomes upset when yelled at
93	ON	10.558(4)	.032	-.002	Wants to travel

Note. N = 492. All items were ordinally scaled.

[a]Category abbreviations: MH = mental health items, ON = occupational items.

[b]tau b was computed for the 2 x 2 situation, i.e., when the df were 1, and tau c was computed for all other situations, i.e., when the df were greater than 1.

Table 4

Common Items Which Were Significantly Related to Attrition

Ordinally-Scaled Items

Item Number[a]	Category[b]	X^2(df)	p	Strength of Association[c]	Nature of Relationship: Woman More Likely to Attrite If She
19	PH	9.688(4)	.046	.092	Dates infrequently
21	PH	15.578(4)	.004	.088	Plans to marry/remarry
111	EM	9.759(4)	.048	-.055	Doesn't want to travel/meet people[d]
113	EM	8.003(4)	.092	-.028	Doesn't want further education
115	EM	14.238(4)	.007	.096	Has relatives/friends in service
117	EM	18.138(4)	.001	.110	Wants to help family financially

Nominally-Scaled Items

Item Number[a]	Category[b]	X^2(df)	p	Strength of Association[c]	Item Content
14	PH	12.240(4)	.016	.124	Childhood clubs
17	PH	15.038(4)	.005	.124	Types of male friendships
20	PH	16.727(4)	.002	.131	Marital history

Note. N = 977.

[a]Item numbers were the same for both questionnaires.

[b]Category abbreviations: PH = personal history items, EM = enlistment motivation.

[c]All values for the ordinally-scaled items are tau c statistics. Cramer V's are entered for the nominally-scaled items.

[d]This item varied somewhat in content from Item 93 in Table 3, perhaps accounting for the different results.

the senior author. A multiple R of .388 was obtained with subsample 2 and a shrunken R of .295 (Guilford & Fruchter, 1978, p. 377).[5]

The Relationship Between Scales and Attrition

As described previously, response options were identified for Samples A, B, and C which discriminate between attritees and survivors. In any future studies, these options are likely to be the most stable since the entire sample was utilized in each case. Information on these options is available from the senior author.

To claim that these options are the most stable is not sufficient, however: They may not be stable enough to base a screening instrument on them. Therefore, an attempt was made to obtain some quantitative information. As described previously, Samples A, B, and C were each divided into a validation (V) and cross-validation (CV) sample. A set of discriminating response options, or scale, was identified for each V sample, the three scales respectively termed (1) the Unique Quest 1 Scale, (2) the Unique Quest 2 Scale, and (3) the Common Scale. Options identified in the V sample were then unit weighted in the CV sample and a scale score computed for each woman. Correlating such scores with attrition yielded cross-validation coefficients of .247, .149, and .069 for the above-mentioned Unique Quest 1, Unique Quest 2, and Common Scales, respectively.

[5]Although restricted samples were utilized, one would generally expect the reported correlations to be underestimates.

CONCLUSIONS AND RECOMMENDATIONS

As reported, a shrunken $\underline{R}$ of .30 was obtained between attrition and a set of items measuring preenlistment variables. Moreover, a cross-validation correlation of .25 was obtained between attrition and one of the scales created through empirical keying. Both results suggest that a moderately effective instrument can be constructed for screening current female applicants, although the regression approach seems more promising.

If one examines Tables 2, 3, and 4, one sees that there are 25 items with "strength of association" values $\geq$ .10. At a time when female applicants are required to have a high school education, these items represent the most logical choices for a selection instrument. It is recommended, however, that researchers first evaluate these items from a strict legal and practical standpoint. Some items--for example, those on occupational needs--pose no obvious problem. However, an item on family religion could not ethically or legally be used. There may be some question about using the mental health items, because they may represent an invasion of privacy. Also, it may be possible to "fake" one's responses to the mental health items. That is, if applicants are informed, as required by the Privacy Act, that these items are being used to screen them, they may falsify their answers.

Items which survive this evaluation should then be administered to female applicants at the Armed Forces Entrance and Examination Centers, along with the Armed Services Vocational Aptitude Battery (ASVAB). It is believed by the authors that the Navy is committed to using the ASVAB as its primary screening device for the foreseeable future. The goal in the proposed study, therefore, becomes one of determining whether "preenlistment" questionnaire items significantly improve attrition prediction over and above the ASVAB. (It was impossible in the current study to include the ASVAB as a variable, since the Basic Test Battery was the selection instrument used by the Navy when the study was conducted.)

The current study has additional implications for developing a screening instrument for use when and if women no longer are required to have a high school degree for acceptance into the Navy. That is, the study suggests that the most valuable items for predicting attrition will probably come from the mental health, occupational need, enlistment motivation, and personal history areas (see Tables 2, 3, and 4).

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